CLAIMS:

1. An ASE light source that uses rare earth-doped optical fibers as an optical amplification medium to output spontaneous emission light from the optical fibers, into which excitation light is introduced, said ASE light source is characterized that:

spontaneous emission light generated from Tm-doped optical fibers is inputted to said optical amplification medium.

2. An ASE light source as claimed in Claim 1, further comprising an excitation light source that inputs, to said Tm-doped optical fibers, excitation light corresponding to energy between a $^3F_4$ - $^3H_4$ level of Tm ions and excitation light corresponding to energy between a $^3H_6$ - $^3F_4$ level.

3. An ASE light source as claimed in Claim 1, further comprising an excitation light source that inputs excitation light of wavelength 1,360 to 1,445 nm to said Tm-doped optical fibers.

4. An ASE light source as claimed in Claim 1, wherein excitation lights of different intensities are inputted to said Tm-doped optical fibers through their opposite ends, and said Tm-doped optical fibers generate spontaneous emission light.

5. An ASE light source as claimed in Claim 1, wherein said Tm-doped optical fibers are made of fluoride glass as a base material in which Tm ion is doped.

6. An ASE light source as claimed in Claim 2, wherein excitation lights of different intensities are inputted to said Tm-doped optical fibers through their opposite ends, and said Tm-doped optical fibers generate spontaneous emission light.

7. An ASE light source as claimed in Claim 3, wherein excitation lights of different intensities are inputted to said Tm-doped optical fibers through their opposite ends, and said Tm-doped optical fibers generate spontaneous emission light.

8. An ASE light source as claimed in Claim 5, wherein said Tm-doped optical fibers have a concentration length product of at least 30,000 ppm·m and at most 100,000 ppm·m and a Tm concentration of at least 1,000 ppm and at most 8,000 ppm.

9. An ASE light source that uses rare earth-doped optical fibers as an optical amplification medium to output spontaneous emission light from the optical fibers, into which excitation light is introduced, said ASE light source is characterized by comprising:

first emission means for outputting spontaneous emission light generated from the Tm-doped optical fibers; and

second emission means for outputting amplified light obtained by using the Er-doped optical fibers to amplify the output from the first emission means and spontaneous emission light generated from said Er-doped optical fibers

so that the amplified light and the spontaneous emission light are superimposed on each other.

10. An ASE light source as claimed in Claim 9, further comprising an excitation light source that inputs, to said Tm-doped optical fibers, excitation light corresponding to energy between a $^3F_4$ - $^3H_4$ level of Tm ions and excitation light corresponding to energy between a $^3H_6$ - $^3F_4$ level.

11. An ASE light source as claimed in Claim 9, further comprising an excitation light source that inputs excitation light of wavelength 1,360 to 1,445 nm to said Tm-doped optical fibers.

12. An ASE light source as claimed in Claim 9, wherein excitation lights of different intensities are inputted to said Tm-doped optical fibers through their opposite ends, and said Tm-doped optical fibers generate spontaneous emission light.

13. An ASE light source as claimed in Claim 9, wherein said Tm-doped optical fibers comprise fluoride glass as a base material in which Tm ion is doped.

14. An ASE light source as claimed in Claim 10, wherein excitation lights of different intensities are inputted to said Tm-doped optical fibers through their opposite ends, and said Tm-doped optical fibers generate spontaneous emission light.

15. An ASE light source as claimed in Claim 11, wherein excitation lights of different intensities are inputted to said Tm-doped optical fibers through their opposite ends,

and said Tm-doped optical fibers generate spontaneous emission light.

16. An ASE light source as claimed in Claim 13, wherein said Tm-doped optical fibers have a concentration length product of at least 30,000 ppm·m and at most 100,000 ppm·m and a Tm concentration of at least 1,000 ppm and at most 8,000 ppm.

17. An ASE light source as claimed in Claim 9, wherein said Er-doped optical fibers of said second emission means is made of any one of quartz glass, fluoride glass, and tellurite glass as a base material in which Er ion is doped.

18. An ASE light source as claimed in Claim 9, comprising:

third emission means for outputting spontaneous emission light generated from the Er-doped optical fibers; and

first multiplexing means for multiplexing the output from said second emission means and an output from said third emission means to provide a multiplexed output.

19. An ASE light source as claimed in Claim 18, wherein said Er-doped optical fibers of said third emission means is made of any one of quartz glass, fluoride glass, and tellurite glass as a base material in which Er ion is doped.

20. An ASE light source as claimed in Claim 18, comprising:

fourth emission means for outputting spontaneous emission light generated from the Er-doped optical fibers;

and

second multiplexing means for multiplexing the output from said third emission means and an output from said fourth emission means to provide a multiplexed output.

21. An ASE light source as claimed in Claim 18, wherein said second emission means has an excitation light source that inputs excitation light corresponding to energy between a $^4I_{15/2}$ - $^4I_{13/2}$ level of Er ions, to said Er-doped optical fibers, and

comprises a splitter that splits an output from said second emission means and inputs the split output to said third emission means as excitation light.

22. An ASE light source as claimed in Claim 18, wherein said second emission means has an excitation light source that inputs excitation light of wavelength 1,350 to 1,455 nm to said Er-doped optical fibers, and

comprises a splitter that splits an output from said second emission means and inputs the split output to said third emission means as excitation light.

23. An ASE light source as claimed in Claim 19, comprising:

fourth emission means for outputting spontaneous emission light generated from the Er-doped optical fibers; and

second multiplexing means for multiplexing the output from said third emission means and an output from said fourth emission means to provide a multiplexed output.

24. An ASE light source as claimed in Claim 19, wherein said second emission means has an excitation light source that inputs excitation light corresponding to energy between a $^4I_{15/2}$ - $^4I_{13/2}$ level of Er ions, to said Er-doped optical fibers, and

comprises a splitter that splits an output from said second emission means and inputs the split output to said third emission means as excitation light.

25. An ASE light source as claimed in Claim 19, wherein said second emission means has an excitation light source that inputs excitation light of wavelength 1,350 to 1,455 nm to said Er-doped optical fibers, and

comprises a splitter that splits an output from said second emission means and inputs the split output to said third emission means as excitation light.

26. An ASE light source as claimed in Claim 23, wherein said Er-doped optical fibers of said fourth emission means is made of any one of quartz glass, fluoride glass, and tellurite glass as a base material in which Er ion is doped.

27. An ASE light source that uses rare earth-doped optical fibers as an optical amplification medium to output spontaneous emission light from the optical fibers, into which excitation light is introduced, said ASE light source is characterized by comprising:

first emission means for outputting spontaneous emission light generated from the Tm-doped optical fibers;

second emission means for outputting amplified light

obtained by using the Er-doped optical fibers to amplify one of the outputs from the first emission means and spontaneous emission light generated from said Er-doped optical fibers so that the amplified light and the spontaneous emission light are superimposed on each other; and

multiplexing means for multiplexing the other output from said first emission means and the output from said second emission means to provide a multiplexed output.

28. An optical amplifier which uses rare earth-doped optical fibers as an optical amplification medium and which introduces signal light and excitation light into the optical amplification medium to amplify the signal light, said optical amplifier is characterized by comprising:

first amplifying means for using Er-doped optical fibers to amplify said signal light and then output the amplified signal light; and

second amplifying means for using Tm-doped optical fibers to amplify the output from the first amplifying means and then output the amplified output.

29. An optical amplifier as claimed in Claim 28, wherein said first amplifying means has an excitation light source that inputs excitation light corresponding to energy between $^4I_{15/2}$ - $^4I_{11/2}$ level of Er ions, to said Er-doped optical fibers, and

said second amplifying means has an excitation light source that inputs, to said Tm-doped optical fibers,

excitation light corresponding to energy between a $^3F_4$ - $^3H_4$ level of Tm ions and excitation light corresponding to energy between a $^3H_6$ - $^3F_4$ level.

30. An optical amplifier as claimed in Claim 28, wherein said Tm-doped optical fibers have a Tm concentration of 500 to 3,000 ppm.

31. An optical amplifier as claimed in Claim 28, further comprising third amplifying means for amplifying an output from said second amplifying means using the Er-doped optical fibers and outputting the amplified output.

32. An optical amplifier as claimed in Claim 29, wherein said Tm-doped optical fibers have a Tm concentration of 500 to 3,000 ppm.

33. An optical amplifier as claimed in Claim 31, wherein the Er-doped optical fibers of said first amplifying means has a concentration length product smaller than that of the Er-doped optical fibers of said third amplifying means.

34. A laser oscillator comprising:

an optical amplifier having first amplifying means for using Er-doped optical fibers to amplify signal light and then output the amplified signal light and second amplifying means for inputting the output from the first amplifying means to Tm-doped optical fibers to amplify the output from the first amplification means using excitation light and then output the amplified output;

a filter connected to an output of the optical amplifier; and

splitting means connected to an output of the filter to input one of its outputs to the optical amplifier.